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Featuring

Duties of the Engineer in Connection with Land Takings

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DUTIES OF THE ENGINEER IN CONNECTION WITH LAND TAKINGS

(Presented at a meeting of the Boston Society of Civil Engineers September 26, 1928)

STATE AND MUNICIPAL PROJECTS

By HENRY F. BRYANT,* MEMBER, BOSTON SOCIETY OF CIVIL ENGINEERS

LAND takings for public purposes are acts which, like conveyancing, come within the province and practice of the lawyer. In fact, they are a branch of conveyancing, and, if properly made, require a sound knowledge of the law and the practice of the courts thereunder. They, however, require other things which the practice of law does not often provide, and that is a trained knowledge of what is needed for any given purpose, and how to make those requirements definite.

For knowledge of requirements, the lawyer must depend on the specialist who is most interested in the problem to be solved, and this specialist may be the engineer of the project or members of the committee or board who have charge of the matter, or some other engineer who, nevertheless, calls himself an architect, a doctor, or what not. In these days when we read of musical engineers, butter and eggs engineers, vibration engineers, and endless other types, it is fair to assume that all men are more or less engineers.

This reminds me of one man, a senior lieutenant in a great industry, who is constantly investigating new ideas and devising new methods of manufacture. He never gets far in conversation without assuring his hearers that he is *not* an engineer. I believe he *is* a good engineer under the well-known definition of engineering, and I believe that this is true in spite of his training in accountancy, with only casual thoughts of the control of the forces of nature for the use and convenience of man.

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* Civil Engineer, Brookline, Mass.

So almost every one who determines what and how land is to be acquired by the public is either a full-fledged, trained engineer, or he is one by his very act. For the knowledge of how to make the proposed takings definite things, we must call on that type of engineer who calls himself a surveyor. There are as many kinds of surveyors as there are men, and, as surveying is a fundamental requirement of most engineering practice, it is naturally executed by, or under, the direction of the project engineer.

It is largely in reference to the work of the surveyor in the making of public takings that I wish to address my few words on the subject. Assuming that the engineer, or pseudo engineer, in charge of the project has determined on the requirements, it remains for the surveyor to put them in definite shape.

Usually nowadays each municipality, or the State Department involved, has its own corps of engineers who qualify as surveyors.

Perhaps I had better go a little further into the method by which the state, or the metropolitan district, and perhaps the municipality arrive at their decision to take land for any one of many purposes.

Assuming that the controlling board and its engineering executive have arrived at the conclusion that a new water pipe, a new sewer or drain, a new road, a new park or park addition, a new bridge, or a new hospital or sanitarium, is required in a general locality, it is inevitable that the details of selecting a route, a location, or a design should be left to its engineer and his staff. Of course, no board would come to even a preliminary decision without some study of the methods involved in carrying out its plan, and the possible cost thereof.

The engineer, therefore, must make a preliminary study of the location best suited to the purpose, not only to roughly design his structure to fit, but to get an estimate of land damages. He may conclude to alter the plan in order to reduce costs or improve conditions, and may even go through with that program several times. In ordinary street locations, or widenings the problem may be a little simpler, in that there is likely to be less latitude in fixing upon proper lines, but otherwise it is much the same problem for state, county or municipality, and the methods of approach and final determination are much the same, except that county officials, perhaps to a greater extent than others, are free from the need of getting an appropriation from a reluctant legislative body.

In working up to the appropriation stage, the engineer provides himself with a survey and plan, if that is not already in existence. On this plan, with perhaps additions as required, he bases his estimates. Right here I am confronted with the fact that no two projects require or follow the same program as to the use of a survey. Road locations, as well as some other features, are generally worked out in full detail before they are laid out for acceptance or appropriation, whereas full details of major public works await that inevitable appropriation of funds to carry them out.

The survey for preliminary purposes, in my early days, was executed by the usual transit, tape, and notebook method, or possibly with the use of stadia measurements for the less important locations. Today the plane table, based on a transit skeleton, is fast displacing other methods of plan making.

The growing popularity of this method is due to its economy in both cost and time, at the same time producing a plan freer from errors than those made by other methods. This is particularly true where topography is required, as it so generally is today.

No man in the field, with the territory to be covered directly under his eye, can produce the absurdities which often appear in plans plotted in the distant office from meagre field notes. Moreover, he must record his notes and translate them later if he uses that method, whereas the plane table work is plotted finally without the notes.

The preliminary plan, if any, is followed, of course, by the taking plan. This plan should be the result of laying out, on the ground, the proposed boundary lines, and making a careful survey of them for both plan and descriptive purposes.

I believe that both bearings and distances should be given; that every curve and detail should be definite and capable of reproduction from the plan alone. In the days of compass surveys bearings were the rule. Latterly they have been largely omitted, with a corresponding lack of definiteness, which is most unfortunate, as we are left to depend on other data than what the plan supplies, and those other data are often lacking.

Of course, the free use of stone monuments helps greatly, but never fully compensates for the lack of angular data that bearings or angles supply.

One municipal engineer advocates the use of co-ordinates and a co-ordinate system such as is in general use in the city of Boston. This has advantages if correctly executed, but it is cumbersome and expensive, and errors are frequently cumulative.

A municipality may well adopt such a system, or a district like the metropolitan district of Boston, but the use of meridians and parallels such as would be required for a state-wide or even for a county system, involves disadvantages from complexity and its attending errors which I think more than counterbalance the advantages.

Stone monuments, preferably of hard granite, should be used freely, and this is generally done today on street locations. On water sewer and park takings their use is much less than is desirable.

One thing we must consider today is the number and character of the plans which both common sense and the statute require. Let me enumerate the condition which prevailed in my own town where a street, having building lines and some abutting registered Land Court property, was laid out under the betterment act.

In this case it was necessary to produce, in addition to the original paper or other studies, the following plans and papers to be filed or registered:

1. Record tracing of plan and profile to show laying out, filed locally and signed by selectmen.
2. Order of taking tracing for Registry of Deeds certified.
3. Description and award for Registry of Deeds certified.
4. Certified copy of No. 2 for Land Court files.
5. Certified copy of No. 3 for Land Court files.
6. Tracing showing land affected by betterments (registry).
7. Schedule of betterments.
8. Certified copy (tracing) of No. 6 for Land Court.
9. Certified copy (tracing) of No. 7 for Land Court.
10. Plan of building lines for local filing.
11. Certified tracing of No. 10 for registry.
12. Certified tracing of No. 10 for Land Court.
13. Description and awards for local files.
14. Description and awards certified for registry.
15. Description and awards certified for Land Court.

All of these to be filed within ten days of the layout and acceptance of the street.

I submit that the present laws, if followed, are unnecessarily exacting, and that procedure can be simplified by combining some of these plans. I am not sure that I have included all in the above list, but, assuming it is complete, let us suppose you have half a dozen short streets such as we have nowadays in developed communities. We are forced to load the registry with at least ninety plans and papers, where only a fraction of that number could be made to answer, if the present law were altered.

I don't know to what extent county and state are supposed to follow the rules just mentioned, but probably in much the same manner. I doubt, however, if the law is generally complied with, and suggest it be improved.

Once more, I recommend the production of definite plans, — plans which any one can use to reproduce the lines on the ground. This means bearing or angles. To the Land Court and its rules we owe a great deal for requiring such plans and thus educating both surveyors and the public to their general use.

Boards of survey have become common throughout the State. Many of them have rules for the presentation and recording of street plans which, although sometimes unnecessarily severe and costly, are along the lines last suggested, and should be approved. Their work today is seldom of their own initiative, and does not often mean a land taking, but it is closely allied therewith.

One common board of survey rule, which should be modified, is that which requires stone monuments at all points of curvature and angles of proposed streets, notwithstanding that fills and cuts make it well-nigh impossible to place permanent bounds on those points.

I suggest that the rule be modified to provide permanent markers at tangent intersections or other points, which will remain undisturbed, and hold the lines more securely. Final construction work is bound to destroy the accuracy of any of these points, so temporary monuments, suited to each case, are the best, I believe.

I hesitate to touch on the legal features of land taking, but I will mention one or two points which I have noted.

Years ago, when the Boston parks system was being assembled, not only were deeds obtained where practicable, but takings were made and recorded to cover the entire work. Takings of highways within the park system were included, but I never quite understood their force, unless they were based on a special legislative act. This method has been followed quite generally by municipalities for streets and other takings, and seems to me to be quite logical. It is also true of state and county work, as we all know, but there was a time not long ago when some municipalities demanded deeds, and avoided making takings.

Of course, this meant, and still means, friendly negotiations, which in all cases means good practice and a saving of expense to the public, as compared to formal takings, arbitrary awards, and the resulting lawsuits. Here is where the good engineer in public employ shines brightest outside the strictly professional field. The public knows him to be a dealer in facts, and seldom a partisan, and trusts him accordingly.

For some reason not clear to me this policy of making deeds a *sine que non* has been abandoned for the older practice of both deeds and blanket taking.

One advantage from the latter is that by making the new boundaries definite the old lines, if any, need not be definitely fixed, and the expense and time involved is saved. Areas and dimensions of each parcel can be given by scale, and are sufficient for the making of awards, which need not be based on unit prices per square foot.

One objection to this procedure is the destruction of land marks on old division lines, without substituting dimensions on the new lines. This means that the surveyor for the owner may later have to replace the old lines as they existed before the takings, which is often difficult. I imagine the Land Court would require something more definite, and similar to taking plans for street widenings where complete taking figures of each holding are generally given.

I yesterday had a talk with Mr. John L. Howard of the Metropolitan Water Works Division, and he gave me a brief outline of the practice of his department in the matter of land takings. The interesting features were largely legal, as the surveys and plans are similar to those made for any purpose or by other organizations.

Nevertheless, I make bold to note some of them, as they are largely and naturally the work of the engineer.

Routes for pipe lines or other features are carefully studied on existing or new plans, with relation to property lines, in an endeavor to cause the minimum of disturbance and damages to owners. After a tentative line is fixed, owners are consulted, and if serious difficulties arise, or suggestions are made, the route is again studied, and further negotiations made.

After final determination of the lines, they are surveyed, plans and descriptions drawn, and a taking made of an easement.

A formal notice of taking is sent out to all owners, with an award of one dollar attached. Final awards await conferences, after the taking is made, unless, of course, they had been previously agreed upon. Appraisers, usually real estate men, are called in to advise on values, but generally easements call for a damage payment of 50 per cent of assessed valuation. The state makes the practice, in case of damages from breaks and floodings, of paying only for loss or damage to personal property. Inconvenience, damage to real estate, and other real damage is not paid for, and you are barred from suing the state, except in the matter of land takings, which gives a period of two years when suits are possible.

Now, this is a rather rambling, inconsequential talk on a subject which deserves a more serious treatment. I see only one prominent point which has been made, and that is that takings are now made, and should be made, giving data which are definite to at least the degree required by Land Court rules, and that the method of registering them should be simplified as much as possible.

POWER AND RESERVOIR DEVELOPMENTS

By H. K. Barrows,* Member, Boston Society of Civil Engineers

The purpose of this paper is to describe the more important features of takings required for dam and reservoir sites in connection with power and storage developments, the conditions under which these must be made, some of the difficulties now existing in such matters, and to point out the desirability of suitable legislation to encourage such developments, especially storage reservoirs here in the New England States.

Power Development

A dam site may be defined as a portion of a stream where the topography and character of bed and banks favor the economic construction of a dam, affording a head of water for power use. Another factor often of much importance is suitable topography lying upstream from the dam site to form a pond, to equalize flow and power fluctuations.

The full control of such a site will evidently include all land, property or rights for the area included by the dam site and its proposed flowage. For a non-navigable stream this will mean the acquiring of the land on each side of the river adjacent to the dam site, ownership in this case running to the middle or thread of the stream.

Under the so-called Mill Acts, here in the East a man may erect a dam on his own land, where he owns both sides of an ordinary stream, and flow land above him not belonging to him, provided he does not interfere with any earlier established mill right and pays damages for the flowage. He may then, in addition to his natural right to the fall that exists on his own property, increase this in amount by making use of fall further upstream.

In the West an entirely different situation exists and the doctrine of "riparian rights" is not followed. Here the principle has gradually been evolved that the waters of streams belong to the state and may be granted to an individual by the state. Filings are made by posting a notice on the stream bank or by application to the state engineer or water commissioners. The permit issued by the state is revokable, and expires if use is not made of the water within a certain time.

On large navigable rivers or navigable portions of streams the right to use the stream bed itself must also be acquired. This now means obtaining authority and a license from the Federal Power Commission.

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The purpose of the Federal Power Commission is, briefly, "to provide for the improvement of navigation, the development of water power, and the use of the lands of the United States in relation thereto."

The commission, in co-operation with the other executive departments and with state agencies, is empowered to investigate the cost of water power development, its availability for market, and its fair value in any region to be developed.

Licenses are to be issued to citizens, corporations, municipalities, or states to construct, operate and maintain projects for the development and improvement of navigation, and for the development, transmission and utilization of power (1) from or in any of the navigable waters of the United States; (2) upon any part of the public lands and reservations; and (3) to utilize the surplus water or power from any government dam.

Navigable waters means those parts of streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several states, and which, either in their natural or improved condition, notwithstanding interruptions between the navigable part of such streams or waters by falls, shallows or rapids compelling land carriage, are used or suitable for use for the transportation of persons or property in interstate or foreign commerce, including therein all such interrupting falls, shallows or rapids, together with such other parts of streams as shall have been authorized by Congress for improvement of the United States, or shall have been recommended to Congress for such improvement after investigation under its authority.

Licenses under the act are to be issued for a period not exceeding fifty years, giving preference as far as practicable to states and municipalities in such applications. Annual license charges, reasonable in amount, are to be fixed by the commission, to cover cost of administration of the act and as recompense for the use of national lands or other property. Where a licensee is benefited by construction work of another licensee or storage reservoir or headwater improvement of the United States, the licensee so benefited shall reimburse the owner of such reservoir for such part of the annual fixed charges as the commission may deem equitable. If the licensee cannot acquire by contract or pledges the right to use or damage the property of others necessary for a project under the act, this may be done by exercising the right of eminent domain in the United States District Court.

During the fiscal year 1925 applications for 80 power projects were filed, involving an estimated installation, if built, of 620,000 horsepower, and 32 applications for transmission lines. During the year 18 permits and 53 licenses with an estimated installation of 1,766,000 horsepower were issued. At the end of the year there were outstanding 70 permits and 180 licenses aggregating 8,745,000 horsepower; 83 projects, and a prospective installation of 2,646,000 horsepower, had been completed or was under construction, 10 of which, with a combined installation of 197,500 horsepower, had been started during the year.

Most of this water power under development is on the public lands or in the national forest. While water power on navigable waters totals about 690,000 horsepower, about three-fourths of this is at Niagara Falls.

State Safety Requirements

In certain of the states there is now some control and supervision by state authority, to insure safe and adequate dam construction. In New England and adjacent thereto the situation is as follows:

Maine. — No control or supervision.

New Hampshire. — Control and supervision by Public Service Commission.

Vermont. — No control or supervision.

Massachusetts. — Control by county commissioners.

Rhode Island. — Commissioner of Dams.

Connecticut. — Commissioner of Dams.

New York. — Commissioner of Docks and Dams.

Pennsylvania. — Control and supervision.

Of these, Pennsylvania exercises a fairly detailed control, especially over plans for dams. In most other cases the supervision is not sufficiently adequate.

It is likely that the recent flood in New England and the unfortunate failure of the St. Francis dam in California will give an impetus to legislation to provide for adequate and suitable control by state authority.

Canal and Penstock Takings

Many power developments are made to utilize the fall in river some distance below the dam by canal or penstock, or a combination of these. It may often be essential, therefore, in addition to the land including the dam site, to obtain a strip of land along the river for some distance below. The Mill Acts would not apparently apply in this case, and the necessary land must be acquired by purchase, just as in the case of the dam site.

Value of Flowed Land

Where a parcel of land adjacent to the river, on which there is some fall, is flowed by a power development, if the matter of value comes to the courts for adjustment there is likely to be much difference of opinion as to the basis for valuation, whether simply as farm land or as a proportionate part of the value of the whole privilege occupied by the development. The principle here involved is of great importance and warrants a full discussion.

Reservoir Developments for Power Use

The essentials for control of a reservoir site are similar to those for the dam and pond of a power development. The reservoir may, however, cover some thousands of acres of land and involve numerous complications and difficulties not commonly present in the relatively small pond area of a power development.

Fundamentally, too, a dam built for storage purposes alone does not come within the scope of the Mill Act, so that in most states it is necessary to acquire or get options on all land or property to be flowed before a reservoir project is assured. This, as will be seen, is a very serious difficulty, and an owner of land unwilling to sell may prevent the execution of the project.

Many of our New England rivers are capable to a large degree of regulation by storage reservoirs — of advantage to power and incidentally to avoid floods or minimize their probability — where storage to a high degree is possible. Legislation is badly needed, both to provide power to take land and property rights for such purpose, and to distribute the cost of such improvements, as they should be, upon those benefited. In this connection it is of interest to see what progress has been made in this direction in other states. New York has made the most progress, although Wisconsin has had for twenty years an act of this kind.

New York Storage Act

This was enacted in 1915 and provides for the formation of river regulating districts as public corporations "to construct, maintain and operate reservoirs . . . for the purpose of regulating the flow of streams, when required by the public welfare, including public health and safety." Such districts may exercise the right of eminent domain and of assessment and taxation.

A river or portion of a river may be included in such a district, and its control is through a board of three (two district residents), who receive nominal compensation for their services. This board may proceed to prepare plans for reservoir developments showing the manner in which costs are to be assessed, after due hearings and approval by the State Water Power and Control Commission, and construct and operate such reservoirs.

A list of assessments in each county, town or city is provided their assessors, and the board of county supervisors levies upon each town or city its share of the expense, which is collected from individuals by the assessors in the same manner as taxes.

Bonds issued for construction purposes are not guaranteed by the state, but are covered by a lien on all the properties benefited.

Thus far two such districts are in operation, viz., upon the Black River and the Hudson River.

Black River Regulating District

The largest project of this district is the Stillwater Reservoir on the headwaters of Black River, with a capacity of 4.5 billion cubic feet. This was constructed a few years ago, and its cost of $1,000,000 apportioned among some 46 parties benefited, the largest in amount being about $222,000, and the average assessment about $22,000.

The right of the Board to acquire land by condemnation was challenged (Board of the Black River Regulating District *v.* Ogsbury, 196 N. Y., Supplement 281), but carried through to the Court of Appeals and upheld.

Four issues of bonds have been made by this district, running for forty to fifty years and all bearing 5 per cent interest, but selling to give a net rate of 4¼ to 4½%.

Hudson River Regulating District

This includes a 30,000,000,000 cubic foot reservoir on Sacandaga River, involving an estimated cost of $9,000,000. Here again the right to condemn property of the Fonda, Johnston & Gloversville Railroad Company was challenged, but the right was affirmed by the Supreme Court and unanimously by the Appellate Division, and is now finally before the Court of Appeals.

This project is now under construction, 5 per cent of the cost being allocated to municipalities and 95 per cent to power companies on Hudson River.

Bond issues have so far totalled about $4,000,000 on a 4½ per cent basis, sold to net a little less than this. These are forty-year bonds, 1/40 to be retired each year.

The power available at the reservoir dam has been leased for a forty-year term, whereby payment is to be made on a capacity basis as and when power is available. This revenue will be used to pay operating costs.

Wisconsin Storage Act (Chapter 335, Laws of 1907)

This act gave specific authority to the Wisconsin Valley Improvement Company to construct, acquire and maintain a reservoir system on Wisconsin River to produce a uniform flow, thereby improving it for navigation and other uses and diminishing injury to public and private property. It gives authority to take lands and water rights either by agreement or eminent domain, and provides for the collection of reasonable and uniform tolls from every improved or operated water power below reservoirs sufficient to pay costs and a net annual return of 6 per cent.

Control and supervision are by the State Railroad Commission, and the act is stated to be a public act to be favorably construed to the accomplishment of such purposes.

About 8,700,000,000,000 cubic feet of storage capacity is now controlled by the Wisconsin Valley Improvement Company, and security issues totalling $638,000 have been made.

A similar act was also passed in Wisconsin in 1911 (chapter 640) authorizing the Chippewa & Flambeau Improvement Company to construct, acquire and maintain reservoirs on the Chippewa and Flambeau rivers.

This company has about 17,000,000,000 cubic feet of storage under control, at a cost of about $2,000,000.

On appeal from the decision of the Railroad Commission (Chippewa & Flambeau Improvement Company *v.* Railroad Commission, 164 Wis. 105) the Supreme Court affirmed the decision of the Commission.

DESIRABLE LEGISLATION IN NEW ENGLAND

The legislative essentials to promote storage development are (1) power to take land and water rights, and (2) authority to assess first cost and costs of maintenance and operation upon parties benefited.

As many of our New England streams are interstate, such legislation should, if possible, be parallel in the various states.

Thus the Connecticut River lies within four of the New England States. Storage improvements upon a tributary in Vermont or New Hampshire will be of benefit not only upon the tributary itself but also on the main river below, and it is likely that the inclusion of parties benefited on the main river may be essential in order to make a project upon a tributary worth while.

This matter is worthy of the most careful consideration by the various states if the rivers of New England are to be comprehensively developed for storage and power, and incidentally remove to a great degree the flood hazard.

TRANSMISSION LINE PROJECTS

By ARTHUR J. HARTY,* MEMBER, BOSTON SOCIETY OF CIVIL ENGINEERS

As we look about us and see the speed with which the general business world is moving along and the manifold uses to which electricity is being adapted, it seems fitting at this time to give an outline of the duties the civil engineer is called upon to perform in the important work of distributing power to the consumer.

The intensive development of water power and the creation of large storage basins are fundamental features which are dependent upon avenues for transportation of power to districts remote from the hydro-electric sources. The natural result is the projection and building of electric transmission systems, and the civil engineer today is finding his services indispensable in these projects.

The real efficiency of a transmission system lies in the economic design of lines to transmit the required amount of energy. It would be well for those of our profession who are really interested in the larger problems of electric transmission to read the article written by a former chairman of the Board of the Westinghouse Electric and Manufacturing Company, the late General Guy E. Tripp, and published some time ago in an issue of "World's Work." In that article the advantages of a comprehensive nation-wide super-power system have been exceedingly well expressed. General Tripp's analysis of the intricate yet delicate subject of the utilization of this unknown substance, electricity, for a multitude of purposes shows most clearly that the electrical engineer's duties form the essential and integral foundation of the entire work. The objectives of the electrical engineer's diversified problems react to give the needed assistance to the civil engineer, aiding him in determining his results, varied and trying as they may be. The civil engineer is able to determine conditions on the ground, which will aid in the solution of individual problems under consideration.

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* Of Charles H. Tenney & Co., Boston.

And so we arrive at the beginning of the civil engineer's course of action. The duties required can be mapped out as follows:

1. A reconnaissance survey of the territory involved.
2. A completed survey, plan and profile.
3. The obtaining of the rights of way or grants.
4. General information.

A Reconnaissance Survey

This can be made in many ways by means of compass survey and field inspection. A field inspection by traversing the area under consideration from one terminus to the other is absolutely essential. If the project is of any magnitude, it is very desirable to have aerial photographs made for the entire area. This method is now being adopted as a preliminary as well as a permanent method. It enables the Engineers, after a little careful studying of this phase of the work, to determine accurately many important features which, by other methods, would take a great deal of time and be a great expense.

For instance, one can easily classify the following conditions: woody or swampy country, orchards or farm lands, the location of buildings, streams, roads, etc. In brief, one can visualize many difficult situations which heretofore could be met and overcome only by actually traversing the area under consideration. With this aerial survey at his disposal the engineer can map out with definite precision the course he wishes his field party to pursue. A further advantage is that, with the aid of a stereoscope in conjunction with the aerial photographs and a geodetic contoured map of the terrain in question, the contour of the country is vividly brought before the eyes of the engineer.

The cost of aerial photography as above outlined can be justified as follows: By studying the photographs of the proposed route and acquainting himself with the territory the civil engineer can eliminate many days of actual field work on the ground. Aerial photographs are made to an accurate scale and generally cover a strip of territory one mile in width. The engineer, by sketching in the route to follow certain boundary lines, walls, or fences, can keep the line away from buildings or developments that might cause unfortunate delays. Fig. 1 gives an example of this.

If the engineer should get into some complex situation where the growth of a city or town or suburb shows up as a puzzling factor, at very little expense he can go out on the ground and make a personal investigation of the locus in question and vary his general course to overcome what at first seemed insurmountable. A condition such as this is only one of many which an aerial survey reveals, and which could not be known otherwise except through actual traversing of the terrain. The many situations of this kind that do arise prove the great value of aerial photographs and maps.

The Completed Survey (Plan and Profile)

In projecting a survey for the transmission line, the time of year plays an important part in the economical side of the work. All things being considered, in the northern part of our country the fall and spring appear to be the most satisfactory seasons. Some winters are fairly mild, others severe. In the aggregate, the midsummer seems very inadvisable because the growth and brush hamper the work more than the ordinary cold weather does.

In the actual surveying a great deal more work can be done and a material saving made if the survey, preliminary to staking the line, be made by means of the so-called stadia method. Some engineers question the use of the stadia method and claim that it is inaccurate. These men generally are civil engineers who work almost exclusively on projects where errors are unpardonable and which require unquestionable accuracy. The location of a high voltage electric transmission line is not materially affected if in a mile of survey there is no more variation than five feet. Such accuracy is attainable with the stadia method if due care is exercised. Levelling, also, can be done by this method. Many of the transmission lines being built and operated today would be only myths and dreams if the usual method of measuring distances by means of the tape and plumb bob were exercised.

Having before him a plat of the area over which the proposed transmission line is to be built, the electrical engineer makes his decisions as

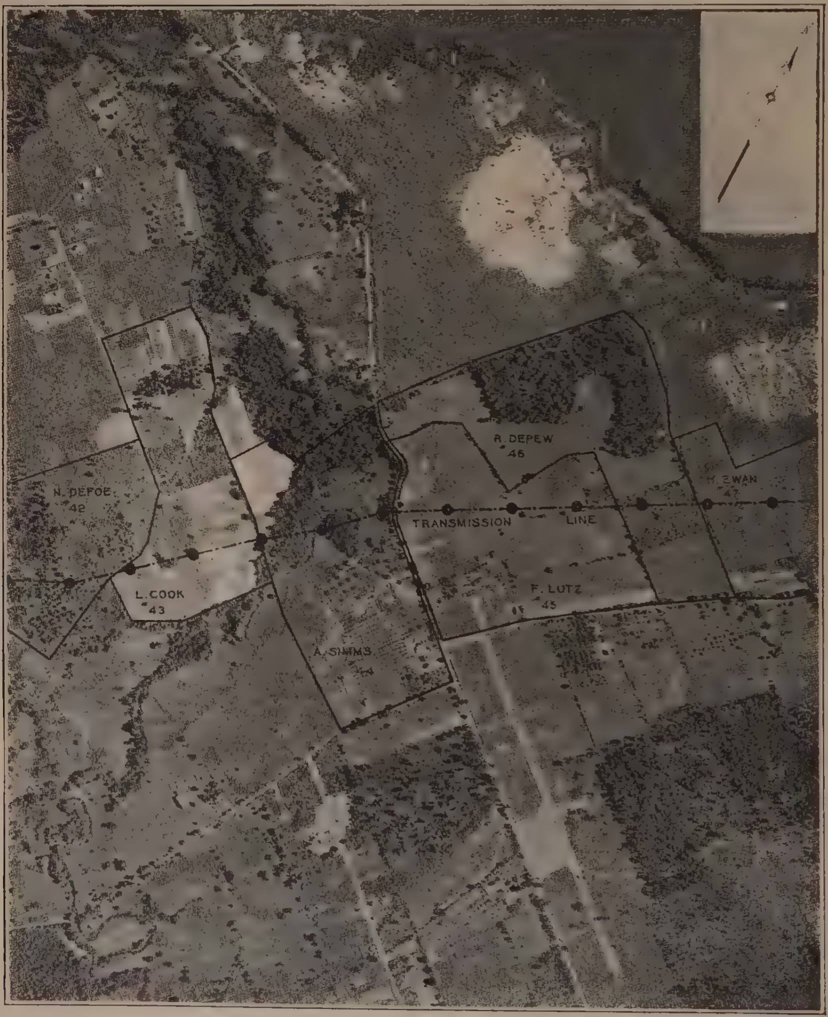

FIG. 1. — PROJECTION OF A TRANSMISSION LINE ON AN AERIAL PHOTOGRAPHIC MAP

(Courtesy of the Fairchild Aerial Surveys Inc.)

to type of construction, whether wood or steel. The width of right of way to be taken is also decided. It is necessary from the standpoint of operation that the line shall clear all obstacles, trees, houses, or, in general, anything that might exist in or about the location tending to affect the safety of the operation of the line.

Obtaining the Rights of Way

This is a very important procedure and there are many ways in which it can be executed. It is fair to assume that many differences of opinion can be had on this subject in regard to details, but from actual experience it is plain that the rights of way work can be divided into two major parts:

1. The necessary legal forms.
2. The qualifications of the right of way engineer.

1. *The Legal Forms*

This is purely and simply a legal matter. Many forms are used, but they vary in technicalities. Before passing on, it can be said that a clear, concise statement of what is required, with due regard to the requirements of legal procedure, wins more good will than any carefully phrased wording that may be subject to misinterpretation.

2. *The Qualifications of the Right of Way Engineer*

The term "right of way engineer" is used in this article to mean the man selected to go out and interview owners and secure the options or grants for the location of the proposed transmission line. The importance of the work should not be minimized, and the choice of a man should be carefully considered. He should be a man of integrity and of some personality, fearless, forceful and resourceful. His training should embody a groundwork of general nature toward one end, namely, he should be able quickly to visualize the entire length of the line and the properties adjacent to same. In his dealings with the owner this faculty will assist him to effect a compromise on location should the occasion arise or should the owner of the locus in question propose a change less damaging to his property and easier of settlement.

The right of way engineer should acquaint himself with the workings of not only the real estate law and the general laws of the states in which he is working, but also the specific laws relating to the taking of land by eminent domain, commonly known as condemnation. The latter is explained later in this article. Seemingly a broad subject, this can be condensed to the following:

What are the rights of an option? The rights of a deed?
What rights has the corporation in the issue at stake?
What rights has the individual?
How is an option or deed properly executed and recorded?
Are there any dower rights?
Liens and mortgages and their bearings on the issue.
The proper wording needed in the description of an easement.

In the dealings of the right of way engineer with the public honesty is essential. He must never forget that, however shrewdly he acts in securing signed agreements, close bargaining that savors of dishonesty has been the reason for more lawsuits and sore spots in the public mind against corporations than anything else. A settlement with some owner for a larger amount than was anticipated by the corporation reacts more to good will in the public mind than shrewdness. This is in no way intended to include uncalled-for wasting of money, for many conditions arise in the field which could never have been foreseen in the office.

The securing of rights of way is interesting work, but very tiring. To be adept in it one must really be versatile, open-minded and fair.

In conclusion, men should be trained to handle this problem from all angles, not only from the corporation's viewpoint, but also with regard to the feelings of the grantor. The engineering features should be well understood, for no one can sell another an idea who has not schooled himself properly in the details of the project he has in mind. Successful right of way work shows true salesmanship.

General Information

Many conditions exist in this work which cause friction between the corporation and the owner of land, and at times these cause a lull in the negotiations. It becomes a quagmire, and neither side sees any hope of an agreement. Without taking sides on the right or wrong of the subject, there is a way to settle such disputes. In almost all states in the Union there are acts of legislative bodies which empower public service corporations, under specific conditions, to take land by right of eminent domain. The usual procedure for exercising this part of public utility rights is as follows:

A plan showing the entire layout of the line is filed with the clerk of the county wherein the proposed line is projected. Individual plans also are filed showing the land of each owner and the line, the width of the right of way, and the locations of the proposed poles or structures. In some states the plans are signed by the president and clerk of the company and bear the corporate seal.

A preliminary hearing is held before a judge, both parties interested being present (corporation and owner). After the right of exigency has been proved, and it has been established that necessity demands the line, the corporation is given the right to proceed with the construction of the line. A bond is filed with the court to satisfy any demand that may be adjudged later, and the court appoints three commissioners, who recommend a fair settlement for the damages incurred. After the commissioners have heard the case and rendered their report, the corporation pays the owner the amount assessed by the court and the matter is closed.

Many cases do not get as far as the findings and are settled out of court; others are bitterly fought by both sides. It is best for both sides to come to an amicable agreement, if possible, and corporations are endeavoring to their utmost to do so, for they as well as the owners of properties involved realize that costly lawsuits are poor assets.

When all rights of way are secured, the line is turned over to the Construction Department for the final stage. In regard to the construction just a word can be said. The rights of way as signed probably provide some courtesies to be shown, such as burning of brush, repairing fences or walls, cutting of timber in lengths, piling or carting of same, or many other small but important concessions. It will save a lot of trouble for both sides if a complete tabulated list, showing the concessions made to each owner, is made and copies given to the contractor and the construction engineer. This will prevent misunderstandings, create good will, which is priceless, and assure the owner that the corporation is doing its utmost to check injustice or abuse.

LEGAL ASPECTS

By HARVEY E. WEIR *

EMINENT domain is the power inherent in the sovereign state to take or authorize the taking of any property, or rights in property, within its jurisdiction for the public use. It might also be said to be the right which belongs to society or to the sovereign of disposing in case of necessity and for the public safety and welfare of all the wealth contained in the state. The power of eminent domain has been deemed to include

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* Attorney, Boston, Mass.

the right to take the property of others, and not only in case of extreme necessity, but for the ends of public utility, but always subject to the necessity of paying a reasonable compensation therefor. By virtue of this power, back of all private titles lies the power of eminent domain as an inherent attribute of organized government. Under this power, whenever the Legislature judges it expedient, the property of the citizen may be appropriated for public use, and the taking of the property may be by a legislative act, or the right may be delegated to a board or commission. The uses for which land may be taken must be public uses, but the action of the Legislature and the courts, by their interpretation of the law, has constantly increased the number of recognized public purposes, and under the present tendency towards larger powers of government this process will doubtless go on in the future.

The only limitation placed on the exercise of the power of eminent domain not imposed by the Constitution is that the state cannot take or authorize the taking of property not within its jurisdiction. There are certain constitutional limitations which apply and which should be set forth here. The Fifth Amendment to the Constitution of the United States provides, among other things, that no person shall be deprived of life, liberty, or property without due process of law, "nor shall private property be taken for public use without just compensation." This amendment applies only to acts by the United States, but the Fourteenth Amendment provides that no state shall deprive any person of life, liberty, or property without due process of law. The Massachusetts Constitution provides, in Article 12 of the Declaration of Rights, that "no subject shall be arrested, imprisoned, despoiled, or deprived of his property, immunities, or privileges, put out of the protection of the law, exiled, or deprived of his life, liberty or estate but by the judgment of his peers or law of the land."

There is a provision especially applicable to the power of eminent domain in Article X of Part I of the Massachusetts Constitution which states that "whenever the public exigencies require that the property of any individual should be appropriated to public uses he shall receive a reasonable compensation therefor," so that we find that one of the essential elements of the taking of land for public uses is that the owner shall receive compensation therefor, and the taking of private property for a use not public or without reasonable compensation has been held to be a deprivation of property without due process of law.

The question of whether public exigency is such as to necessitate the taking of land is usually a political and not a judicial question, and the owner has no constitutional right to have the necessity or expediency of the taking submitted to a court or jury. The Legislature or the body to which the power has been delegated may decide in each instance whether a public improvement shall be undertaken and what land or interest in land shall be taken for it. In many states the act of condemning land is by judgment of the courts made upon application by the city, town or public authority, but in Massachusetts since colonial days the taking has been made by special act of the Legislature or by the body to which the power has been delegated, and a right to a hearing before a jury given to the parties aggrieved by the taking. The right to trial by jury in land damage cases in Massachusetts arises from statutes which were in effect at the time the Massachusetts Constitution was adopted, and as a result the courts have held that in order to deprive an aggrieved party of the right a constitutional amendment would be required.

Ordinarily when land is taken the interest is defined by the instrument of taking or the nature of the interest taken may be measured by the object to be accomplished, and it may be an easement only or a fee, but whatever the interest taken the owner must be fully compensated. The right to compensation does not, however, affect the validity of the taking where the owner assents or allows his claim to be barred by the statute of limitations, which is usually one year from the date of the recording of the order except in cases where water rights are taken, in which case the statute begins to run from the time of the actual diversion of the waters, and I am of the opinion that this is so even though the diversion is merely for the purpose of testing the lines.

Another exception is in takings for highways or town ways or for ditches or drains for draining the same, in which case the statute provides that the right to damages shall not vest until such way, drain or ditch has been entered upon or possession has been taken for the purpose of constructing the same, and if such entry is not made or possession taken within two years of the date of the order the taking is void.

When land is taken for public uses, unless the contrary appears the fee is retained by the owners and an easement only is acquired by the taking. The land in which an easement is taken can be used only for the purpose designated by the taking, and if the land is used for a different purpose it must be done by making a new taking and paying additional compensation therefor. The owner may maintain an action of trespass against any person who makes a different use of the land in which an easement has been taken which is not justified by the public easement. If an easement is taken in land for sewers, water pipes or highways, and the works or highways are abandoned, the owner of the fee holds the land free of the previously existing easement. Public easements in highways include every mode of travel for the transportation of persons or property which is reasonable and proper in the use made of public streets, and includes every reasonable means of transportation and transmission beneath the surface of the ground as well as upon or above it, and the abutting owner has a right to the use of the highway to the extent that it does not interfere with the proper use by the travelling public of the highway, and it has been held that sewers, water pipes, gas pipes, telephone and telegraph wires, electric light wires, may be rightfully laid in any public way without entitling the owner of the fee to additional compensation.

Land taken in fee cannot be abandoned, as the title has vested in the taking authority; but an easement may be abandoned, and the fact of abandonment may be considered in the reduction of damages.

It might interest you to know that the title to property acquired by eminent domain is an independent one not derived from that of the owner of the land, and that therefore the existence of an easement taken by a city under the right of eminent domain in a strip of land for laying and maintaining a sewer is not a breach of a covenant in a deed of the land warranting the title against the lawful claims and demands of all persons claiming by, through or under the grantor, as the action of the public authorities was neither caused nor permitted by the grantor.

It has been held by the court, in Massachusetts at least, that the taking of land for a public use is strictly a proceeding *in rem*, *meaning against* the *property* rather than against the *person*. Thus the power when exercised acts upon the land itself and not upon the title or titles if there are other interests, and upon appropriation all inconsistent proprietary rights are divested and thereafter the owner or holders of estates are entitled to full compensation according to the interest and the extent of the taking, but the paramount right or title is in the public by an independent title, and is not subject to encumbrances of any kind, but as a practical matter all encumbrances, such as taxes, leases, attachments, mortgages and other liens, are usually removed before the compensation is paid, and sometimes they are removed by payment from the amount of the compensation, by authority of the owner.

By Article XXXIX of the Amendments to the Declaration of Rights of the Constitution of Massachusetts, Article X was amended by giving the Legislature the right to take by special acts for highway purposes more land and property than is needed for the actual construction or improvement of highways. This is called excess condemnation. Under this amendment the Legislature may also sell either with or without restrictions the land remaining after the construction has been completed. This was a move in the proper direction, as it provided the engineers with an opportunity in laying out highways or streets to properly protect the frontage where the old street line was changed, and to remove dangerous traffic corners by restricting the land before resale so that the land cannot be used for purposes which might endanger persons using the highways.

The exercise of the police power should not be confused with the power of eminent domain. The zoning regulations are an example of the police powers. Zoning regulations do not come under the power of eminent domain, but under the police power (so called), which power is not defined by the Constitution or the laws, but is left to the judgment of the courts. In the zoning regulations no right of compensation adheres to the owners of the property, the theory of law being that the whole community is equally benefited by restrictions upon the use of individual property, and that therefor the individual owner is not injured in the use to which such property is designated. The police power as applied to zoning is subject to the restriction that every person in the particular class must be treated alike, but that there may be different classes, such as business districts, industrial districts, residential districts, apartment districts.

The procedure in exercising the power of eminent domain is governed by chapter 79 of the General Laws, which sets forth in detail the necessary steps in making a taking, and this procedure may be of interest. In the first instance there must be a special act of the Legislature authorizing the taking unless it is to be taken under the General Enabling Act, after which the engineers prepare the necessary plans, then the order of taking is prepared and adopted, the description being taken from the plan. This chapter states that this description shall be sufficiently accurate for identification, and a mistake in the description would not invalidate the taking if the property could be identified. The order of taking must also state the interest taken in the land, and in case such taking is for an improvement for which betterments may be assessed, it shall state whether betterments are to be assessed therefor.

In many of the plans which have been prepared for taking purposes, and from which I have drawn takings, the names of abutting owners were not given, nor was there a definite starting point to describe the parcel of each owner separately. I have assumed that this was because the engineers did not understand that although the land taken is usually bounded as a whole in the instrument of taking, yet when settlements are made, a deed is usually obtained from the owner at the time of the taking. I am not trying to tell the engineers their business, as McCullough pointed out in his book on practical surveying, but mention it merely because I know that if the above method of settlement was understood by those in charge of making plans they would make an effort to see that a definite point was shown on each parcel either by bound or street lines or distances from other definite objects.

This does not in any way cover the entire subject, but the time given would not permit of an exhaustive treatise.

Discussion

Professor Breed:* In acquiring land the combined services of the legal and engineering departments are usually required. Besides running out taking lines and defining them on plans, the engineer often has to collect other useful data for the legal department, and sometimes his relations with the landowners is necessarily intimate. It is advisable, therefore, that the engineer be familiar with the process of land takings, whether by condemnation proceedings or for direct purchase; the basis for the taking may materially affect the extent and character of the work of the surveyor.

It early became necessary to acquire lands for public purposes, — first for highways and later for water supply, then for railroads. The right to take private land for any of these purposes by eminent domain was clearly recognized, and laws providing this method appeared on the early statutes.

It will be noted that these takings of private property were for the convenience and security of the public. They were for the purpose of providing ways for public travel and means for securing the public health. In England and other European countries this general method had been well established, for society had recognized its necessity.

The earlier privately owned public utilities obtained franchises by the acquisition of land as purely a matter of trading between the corporation and the individual, but as these public utilities have become more a necessity, they have drifted, and are continuing to drift, into that class of service which comes under the scope of public necessities. In some States today the right of eminent domain is accorded public service corporations for the acquirement of that land which is necessary for the construction of a plant to produce the intended public service. This applies to water power companies and often to pole lines through which their product is distributed. Eminent domain, therefore, appears to be a power given only to those corporations whose rates of charges are controlled by a public body, such as a public utilities commission, and given still rather sparingly, although the tendency is towards increasing the application of eminent domain to these projects.

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* President, Boston Society of Civil Engineers.

QUESTION: I would like to ask Mr. Bryant whether I understood him right. Did he say that a plan had to be sent to the Land Court showing the cost of the project?

MR. HENRY F. BRYANT:* I don't remember that I said anything relating to cost. The requirements to which I referred covered only a description of the parcels, — such information as the Land Court would need for future conveyancing.

MR. C. FRANK ALLEN:† I have been interested to notice the grasp which the engineering speakers have had with relation to what it is necessary to do in a legal way in order to take care of these matters. I have long had a feeling that an engineer who has had considerable experience in a certain line where legal matters are involved, becomes a pretty good lawyer in that particular line. I believe that bankers are thoroughly familiar with the laws which affect them in their particular line, and men of large intelligence, such as most of the engineers are, become acquainted with and absorb the law touching their particular activities to an extent that the average practicing lawyer has not done. The lawyer has a very wide field to cover, and unless he is a specialist he is not likely to be as familiar with particular phases of the law as the engineer or the banker is in his particular line. I believe it is true that the engineer, after he has acquired experience, will do well to carry his work in arranging details and preparing documents as far as he is able from his standpoint, and submit his results to the lawyers afterward.

In the matter of construction contracts, I believe the best results will always be secured if the engineer familiar with his work prepares his contract form. This must, of course, be submitted to his lawyer before it is finally adopted. But if a construction contract is started by the lawyer the result is not likely to be as good. Furthermore, the engineer, I take it, in public work, is more likely to be permanent and to acquire a grasp of the subject than the solicitor, who is more likely to be changed either through political expediency or his desire for advancement.

I would like to urge upon the engineer that he should consider it part of his duty to become as familiar with the laws that have to do with his profession as possible, and take a large share in the preparation of any documents on construction work. This point of view has been very much emphasized by the very able papers on these subjects, presented by engineers tonight. You will find some difficulty in discovering a lawyer who can present a paper on these subjects as ably.

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PROFESSOR BREED: Mr. Bryant is right in pointing out the necessity of giving not only distances but also angles or bearings if property takings are to be accurately fixed. The law, if I understood Mr. Weir correctly, provides that the taking be set forth in a manner sufficient for identification. I agree with Mr. Bryant that it should go farther than that. You should not only be able to identify the property, but should also be able to rerun its boundaries. This incompleteness was indicated by Mr. Weir in his statement to the effect that he had difficulty in properly describing land for which he had to draw the deeds. This can readily be avoided if the description is started at some easily identified and permanent bound, even though it is not on the property line, and then show all distances and angles, tying in the bound with the property just as is required by the Land Court. Both parties to the transfer are entitled to all of this information. Added to that information, I usually give to the legal department a word description of the boundaries of the property, starting from a well-defined and easily identified point. I do not see why the engineer should not give all of that information because he has to obtain it in making his survey, and if he does not give it he is withholding something often of value to both parties.

MR. BAYARD F. SNOW:* Both Mr. Bryant and Mr. Weir spoke about the difficulty of defining accurately the bounds of each parcel. In a case I have recently had to do with, where a long taking was made through many properties, it was quite possible to define very accurately the taking as a whole, so that it can be reproduced at any time, but it was almost impossible in some cases to define the taking from each individual owner. Some were in dispute. Some had never been surveyed. Some apparently were not owned by any one, or the ownerships overlapped. In other words, the ownerships of the various parcels did not tie up to one another. We finally decided, after considerable study, that to attempt to delineate each parcel would involve us in litigation, endless surveys, computation, etc., and would, after all, serve no particularly useful purpose. We were not taking in fee but in easement, but the principle would hold in either case. After conference with our counsel we decided to define our taking so that one could lay it down on the ground, naming all the parties from whom takings had been made and showing the parcels as clearly as possible by scale, but without defining them in any way. If we hadn't done this I can see that it would have taken years to complete the preliminary work necessitated in defining each individual parcel taken.

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PROFESSOR BREED: Easement takings should be defined as accurately as fee takings. I am thinking particularly of slope takings on highways, in connection with the elimination of grade crossings. The definition for slope easements on many plans are rather lax, inexcusably so. Won't Mr. Weir tell us what he considers should be done in cases where the takings as a whole can be easily defined, but where the boundaries between parcels cannot be readily determined?

MR. WEIR:* I don't know how you can get around it. What I had reference to was in a recent case where the taking was of a long strip which was bounded by a curved line a large part of the way. The point of beginning of the taking line was well fixed, but the plan showed no definite bounds or distances from bounds of some of the abutting owners, and if we had referred to a starting point which was a mile or so away from a definite bound when describing the individual parcel in the deed, it would have looked like "sloppy" conveyancing. It means that if a man wants to find out what has been taken he must go to the registry of deeds and look at the plan, and unless he can run a line from a definite point he can't tell then. I don't know how to handle a situation like that without a lot of work, but bounds can be set or distances determined at time of laying out. In many cases we managed to get stone bounds set at convenient points.

MR. BRYANT: I recognize the difficulties that have been pointed out, but in the case of the next to the last speaker, and also in the case of Mr. Weir, it seems to me that whoever made the plans that have been described has probably added to the confusion already present and has done so in this way. They have contributed to the loss of record. It is fair to assume that somewhere on the ground there was something that would indicate those lines, especially along the highway where it had been widened, or even in the back yard. When new construction is contemplated and carried through, all those monuments, fences, etc., to which the property lines have been tied, become wiped out, and no record of any kind is left behind. The description of the property boundaries is not tied on to these new lines. How, then, can any one reproduce them? It is like digging up a monument which we find in the woods or on the street. That, in my opinion, is nothing short of a crime. I have in mind one monument I know about, which was taken up by a public official and moved five feet. It had been for many years at a corner on a public way. Everything on the estate was tied to that monument. They did keep a record of how much they moved it, and perhaps that made it better. But in such cases records are being destroyed and no new records left to replace them.

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* Of Newton & Weir, 14 Beacon Street, Boston, Mass.

Mr. Ernest W. Branch:* Various ones have spoken of the difficulty of giving the details of each parcel taken, but I think this has hardly been stated strongly enough. Due to what one speaker calls "sloppy conveyancing," a very considerable proportion of the deeds to property define it so inadequately that it is absolutely impossible from the deed alone to tell what land was conveyed.

Some years ago I had the misfortune to have to do with a deed which had been drawn by an attorney and which had conveyed quite a large piece of property, bounding it something like this: by the ocean on the east, the highway on the west, Smith's land on the north and Jones's land on the south. This attorney told me that this was the best possible kind of deed because it conveyed all the interest that the man had. I asked how one could tell just what area was included in the conveyance. He said that was the surveyor's business. I found later that, representing both seller and buyer, he had managed so that a part of a certain piece of land had been conveyed to two different people.

One great difficulty of surveyors is in preserving monuments. It is not at all uncommon to go and expect to use a monument which one has used many times before, and find it lying by the side of the road. I have in mind a case similar to that mentioned by Mr. Bryant, where the bound moved had been set for Land Court purposes and was referred to on the plans in the Land Court. A surveyor went to the Land Court and got his information, and after using the bound it was discovered by another surveyor that it had been moved a distance of four or five feet. There are too many cases like that. Even though the Land Court is supposed to establish definite boundaries, in many instances it is absolutely impossible to define accurately land which is registered in the Land Court. If this is true with Land Court properties, how much more is it true with many other properties.

I had a case come to my attention some little time ago which illustrates faulty practice along this line. The land in question was in Quincy. The man who was conveying the property has since died. He took in a description to an attorney, to have a deed made. The attorney told him, "This is not definite enough. I can't make out a deed to that because there are no distances given." So the man went away, and, instead of having a survey made, guessed at the length of the four sides of the property, something like this: 400 feet, 300 feet, 250 feet and 75 feet. He gave the lawyer those dimensions, no one of them within 50 per cent right, and a surveyor went down there some thirty years later and tried to fix the boundaries.

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* Civil Engineer, Quincy, Mass.

Some years ago I had various problems on the interpretation of deeds to solve, and, having been offered the help of an expert examiner for the Land Court, I gave him four of our simpler surveying problems, to help in the interpretation of the deeds. Something like eight months later I got an answer to these comparatively simple problems. When the surveyor is supposed to make accurate surveys of all properties taken, perhaps half could in reality be accurately described only after court decisions, except for the confidence that people have in surveyors in general. You see the difficulty of making accurate descriptions of property where there are no lines of demarcation given, no occupancy records, no old street lines to measure from. The best we can do is to guess the lines and more or less the distances. If we do this it usually gets by with the attorneys.

Mr. Arthur J. Harty:* In country property, where a transmission line is being taken, very frequently you will go miles where the property is owned by neighbors with almost no definite line of demarcation. If a center line is given and a description of the taking made, it can be definitely defined.

Mr. C. Frank Allen: I had considerable experience in takings for railroad right of way in New Mexico. The kind of description found most satisfactory there was this. The piece of land was described as follows: 50 feet on each side of the railroad as located between the lands of —— and ——, extending from station —— to station ——, as near as may be; containing so many acres, as near as may be. That deed conveyed land 50 feet each side of the railroad and between the lands of the parties described. The stations given were stated as nearly as we could get them. That served to identify the parcels of land, and the area, as near as may be, was used to determine how much land was taken. At first I described by distances and bearings or angles, but this seemed less satisfactory. In most cases, a piece of land might be described as bounded by a street, by one party on the west, and another on the east, with a detailed description "as near as may be," and with the area "as near as may be." If there should be some overlapping, or the parcels should not quite come together, I believe the deed would still be efficient. If the general description covers all the land taken, it has some advantages over a specific description.

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* Of Charles H. Tenney & Co., Boston, Mass.

Mr. Frank E. Winsor:* The practice, common in New England, of settling for properties needed for public purposes by direct purchase rather than by condemnation is to be commended. It may be of interest to describe briefly the procedure required by law under which land for the Catskill water supply of the city of New York was acquired, and which procedure is so complicated and involves so great a division of responsibility as to defeat its original purpose, which may be assumed to have been to insure the purchase of land for prices fair alike to both parties. The law provided for acquiring property for the New York water supply by condemnation, and there was also a provision by which land could be purchased directly by the Board of Water Supply, which provision was so hedged in by restrictions that it was considered inadvisable to take advantage of it other than in a very few exceptional cases.

The condemnation procedure was substantially as follows: The Board of Water Supply, through its engineers, made surveys and plans in great detail of lands required, and in accordance with the interpretation of the law, and with long-established custom, all properties, including those of small value, were required to be shown with courses to minutes and distances to hundredths of feet. Six similar sets of plans covering the section condemned were then filed with the Board of Estimate and Apportionment of the city, which Board adopted, modified or rejected them, as they saw fit. When plans were finally adopted by the Board of Estimate and Apportionment, the corporation counsel was required to give notice in the "City Record" (a daily paper) and in four public newspapers, two published in the city of New York and two in the county in which the land to be taken was located, of his intention to make application to the Supreme Court at any special term thereof, to be held in the judicial district in which the land was located, for the appointment of Commissioners of Appraisal. The notices or advertisements were required to state the object of the application and to describe the real estate in detail, said advertisements being required to be published continuously in each issue of each newspaper for six weeks immediately previous to the presentation of such petition. The corporation counsel was also required to post handbills in at least twenty conspicuous places in the vicinity of the real estate to be taken.

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* Civil Engineer, 24 School Street, Boston, Mass.

In due time, a justice of the Supreme Court appointed three Commissioners of Appraisal, at least one of whom was required to reside in the County of New York, and at least one of whom was required to reside in the county in which the real estate to be taken was located. The commissioners were required to file an oath in the office of the clerk of the county, upon the filing of which the title to the property taken became vested in the city. The Commissioners of Appraisal were authorized to issue subpœnas and administer oaths to the witnesses, and, in fact, to perform the usual functions of a court.

The city was represented by counsel and employed expert witnesses to testify to the value of the property taken, and the claimants were usually represented by counsel and also employed expert witnesses. The Commissioners of Appraisal had assigned to them only as many parcels as it was expected that they could cover in a year, which time was sometimes extended eight months longer, and possibly, in exceptional cases, to even a longer period. The commission was required to reduce the testimony to writing and to make a complete report to a justice of the Supreme Court, who would consider whether or not the report should be accepted and the awards recommended made. The court might approve parts of the report, or he might refer parts of the report back to the commission or to a new commission, or he might reduce the amount of the awards. Either side within a certain specified time after action by the court could appeal. The claimants on their part were entitled under the law to such compensation as the commission might recommend, and as the court might approve for the services of their counsel or of their experts.

The cost of this procedure is enormous. The very fact that every taking is heralded from the house tops gives every claimant a chance to boost values, and the amount paid for land under this method frequently has very little relation to a fair price between a willing seller and a willing buyer. This method creates a great many jobs for commissioners, expert witnesses and counsel, but unless this be considered desirable, it has little else to recommend it.

The actual cost of land acquired for construction purposes, about 23,800 acres, as published in the annual report of the Board of Water Supply of the city of New York for the calendar year 1927, is as follows:

Amount of awards paid	$11,524,896 00
Amount of expenses paid	6,997,065 00
Total amount paid	$18,521,961 00
Average award per acre	$485 81
Average expense per acre	294 94
Per cent of expense to awards	60.71

PROF. H. K. BARROWS:* I should like to ask Mr. Harty one question. In making takings for power lines in Massachusetts, was that done under special or general acts?

MR. HARTY: I think they were special acts. The taking of land for transmission purposes comes under the General Laws, chapter 164. Section 72 gives that in detail. It begins like this: "Electric companies may petition the department for authority to use or to continue to use as constructed or with altered construction a line for the transmission of electricity for distribution in some definite area," and goes on to state that a company can take such land not exceeding so much in width.

PROFESSOR BARROWS: I notice width is stated, just as in railroads, although there may be additional takings for station facilities, round houses, etc., in a different clause of the same law.

QUESTION: Speaking of the aerial photographs, I wish to bring out the ease with which one can trace a taking in that way, as compared with any other plan of survey. On the photograph you can see the stone walls, the highways, the cutting of the timber which in pine twenty or thirty years ago shows that a farm was there at that time. Then, again, this work can be done without undue publicity. Say in the case of a transmission line. You can take your sheets showing the proposed line and go to the farmer up country and he will say to the surveyor, "Where did you get those plans? I haven't seen any surveyors about here." Then you can explain the situation to him without his neighbor's knowing anything about the line.

MR. F. N. FOWLER:† There is another thing about aerial surveys which I consider quite important. When the right-of-way buyer goes to the owner to buy the property, he is frequently referred to an attorney. The attorney is often at a distance from the property. It is customary among attorneys to advise the owner what price he should get for the right of way. If the right-of-way buyer has an aerial photograph with him to show the character of the property over which the right of way is taken, and can explain the different types of fields through which the line passes, it is frequently much easier to close the transaction with the owner, through the attorney.

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* Professor of hydraulic engineering, Massachusetts Institute of Technology, and Consulting Engineer, Boston, Mass.

† Engineer, 260 Tremont Street, Boston, Mass.

One other thing occurs to me. I have been using aerial surveys for over four years. By the use of radial control we are able to lay out the property lines as well as our transmission lines with a degree of accuracy that really counteracts some of the errors made in a ground survey. In one instance, where we made a road traverse of about six miles and then covered the same area with a radial control map, we found that the radial control map and the plat of the ground survey did not coincide. We were pressed for time, but we ran a second traverse around the highways and we found three places where errors had been made. In one place 100 feet had been dropped, and at two other points errors of one degree each in turning angles had been made. With these corrections and replotting, the radial control closely coincided with the ground survey. We no longer feel that we need to make a road traverse when we have an aerial survey.

QUESTION: I do not just understand that expression "radial control." Is it made from an aeroplane?

MR. FOWLER: I do not know whether I can explain it clearly or not, for the reason that, excepting for our earliest use of this process, all of the actual work has been done by one of my men, and he has developed the process far beyond our first use of it. However, I will try.

In the first place, we take a series of photographs and by careful scaling obtain a ratio of scale between succeeding photographs. Then by a photographic process they are enlarged or reduced, as the case may be, so as to bring all of the photographs closer to the same scale.

The pictures are overlapping to the extent that the photographic center of each picture appears on two other pictures; that is to say, the photographic center of three successive pictures appears on the central picture of the group. With these centers identified we carefully measure the angle between the lines drawn from the center of No. 1 picture to the center of No. 2 picture, and from the center of No. 2 picture to the center of No. 3 picture. We carefully scale the distances between the centers of pictures. In this way we obtain a traverse of the center line from picture to picture. This traverse is plotted to scale and the pictures oriented on the paper.

We have control points such as triangulation stations or town boundaries, which are easily identified on the prints and separated by known distances of perhaps five miles or more. One of the control points is identified on three adjoining and overlapping photographs, which have been properly placed and oriented on the plotted photographic center line traverse. From the center of each of these three photographs a line is drawn through the control point on each picture, respectively. At the intersection of the three lines, thus radially drawn, is the true location of the control point. In like manner, from the pictures properly laid and oriented on a photographic center line traverse, any other control points are established by radial lines.

If the distance between control points, thus radially plotted, is not the true distance, it will nevertheless be a fairly close approximation of the true distance, so nearly so that it is only necessary to correct the photographic center line traverses in the same manner as is used to balance a survey, and thus bring the line between control points, radially plotted, to its actual distance. Once this is done, any number of points may be located with a reasonable degree of accuracy by the use of radial lines from the centers of adjoining and overlapping photographs in the same manner as the control points were located.

It is not necessary to have the pictures of exactly the same scale because we are using horizontal, central angles, and radial lines. Displacement of points, due to differences in ground elevation, is thus overcome, and has no effect whatsoever on the completed map.

Radial lines radiate from the photographic center of each picture and in a horizontal plane; that is, a plane parallel to the photographic film.

MR. JOHN D. HAUGHEY:* The principle of radial control is a very simple one. It consists simply in the focussing of a large number of different measurements on one point. That is why it is called radial control. We draw lines to that one point from several positions, which serves to fix that point. The term "radial" comes from the fact that these lines radiate out from that point.

I might say that radial control is not the only method of laying maps. There are several different methods, but I think this is the best and most accurate and the easiest.

PROFESSOR BREED: In using aerial maps, I have sometimes found it very difficult to discover any object appearing on three sheets which I could identify. Take, for example, maps of a wooded country; it is almost impossible for me to find the same point on three photographs, because the whole thing is so uniform in appearance. It works out all right if there is a railroad track or telegraph poles, but when it is over the unbroken forest it is a difficult thing. In such instances I have found that in order to make good use of the pictures I had to lay out a base-line or traverse, and locate known points by cheesecloth crosses or circles for identification; these show up plainly in the pictures.

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* Sales manager, Skyways, Inc., Copley Plaza, Boston, Mass.

Mr. Haughey: I think it is extremely rare to fly over a country which presents in all directions the exact appearance. I think even in forest mapping close study would reveal points of identification, even if they were only shadows. Perhaps the pictures to which you refer were taken from too great an altitude and the detail was not sufficiently clear. That might be corrected by taking the photographs through a magnifying glass or stereoscope. I have never seen a print which presented a perfectly even appearance.

Professor Breed: I agree that there are plenty of variations, but I cannot pick them out. It may, of course, have had something to do with the sunlight on that day.

Mr. Haughey: The effect of sunlight on different days is quite different, and also at different seasons of the year. It is almost impossible to duplicate pictures taken on one flight by those taken on another flight.

When I first started out I thought aerial surveying was the panacea for all surveying ills, but I have since found out that it has some limitations. But as the question of accuracy has been set forth tonight, and the difficulties with surveying and the drawing of deeds, I don't believe that this question of accuracy will present much of an obstacle to the aerial survey. I think it is almost always possible, except perhaps over water, to find various points for identification. Where the centers of two pictures land on the same pond or lake, in that case it is impossible, because water presents the same view at all times, although if the wind is blowing it may present different views.

Professor Breed: The element of time has not been touched upon. The quickness with which results can be obtained from these aerial surveys is a big factor, even if one is a little wary of its accuracy. The element of time is a valuable consideration, and for many purposes the precision of aerial plans is sufficient for preliminary purposes, and in some cases even for final purposes.

OF GENERAL INTEREST

AN AMERICAN TECHNICAL SCHOOL IN EUROPEAN TURKEY

By C. Hale Sutherland *

It is nearly five hundred years since Mahomet II, later called Fatih (the Conqueror), sent his soldiers and his workmen by the thousands across the narrows of the Bosporus in the dark of a late fall night and commenced the construction of that picturesque fortification Rumeli Hissar, which still dominates the straits. So mighty were their efforts that in forty days it was finished, and Mahomet with his cannon controlled the road by which grain came from the north to Constantinople, capital of the Byzantine Empire. More than that, he had a bridgehead for his attack on that ancient stronghold which had so often defied the armies of his race, a town with walls so mighty that the next spring, 1453 A.D., 8,000 men were able for fifty-three days to hold at bay 200,000 Turks. Janissaries and all the finest fighting men of that century.

Today, almost intact, the old walls of Rumeli Hissar and the stories that cluster about them fascinate every visitor to Constantinople. These are the heights where Darius sat upon his throne and watched the passage of his host on its way to subjugate their Scythian foemen. In these towers were mounted the first cannon to play any large part in our western wars, and here they gave proof of their worth by the sinking of Greek shipping attempting to run the blockade. Long years later a new Sultan passing in his boat heard wild shouting from these towers, and thus learned of the agonies of political prisoners kept there for years by his predecessor, and was moved to release them. Across the half mile of swift deep water a little river flows lazily into the Bosporus, the storied Sweet Waters of Asia, on whose banks stands the castle of Anatoli Hissar, built by Bayezid, grandfather of Fatih, who died grieving over his defeat by Tamerlane.

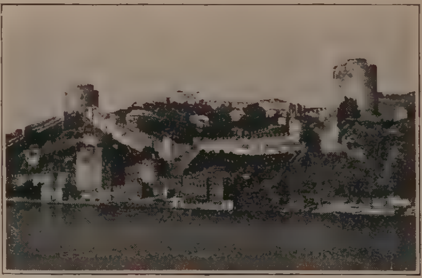

FIG. 1.—RUMELI HISSAR AND ROBERT COLLEGE

A little more than four hundred years after the Conquest saw a very different sort of construction rising on the heights above the old ramparts of Rumeli Hissar. In 1869 the cornerstone of Hamlin Hall was laid and Robert College moved into its blue limestone walls two years later. This institution, an American college chartered by the Board of Regents of the State of New York, had been started in 1863, two years before our own Massachusetts Institute of Technology opened its doors. Its founder was Christopher Rheinlander Robert, a New York merchant of Huguenot stock, the actual work in Turkey being carried on by Dr. Cyrus Hamlin, a brother of our Civil War Vice-President, who is also remembered for the vigor and practicality of the aid he gave to Florence Nightingale when she was nursing the Crimean wounded at Scutari, across the Bosporus from Constantinople. Steadily the college grew in numbers, both of students and of buildings, and today seven stone-walled buildings of generous size are required to house the educational activities incident to training over 700 young men and boys in the multitudinous subjects of western learning. In its early days there were only the college, patterned after the classical model of that time in the United States, and the Academy, the preparatory school so necessary to give the entering students a knowledge of the English language in which all the work of instruction is carried on. In 1912 the Engineering School was started, and so, when the hardships of the World War came to Turkey and to the college, there were engineers ready to apply technical skill to meeting the emergency. Professor Scipio, then as now Dean of the new school, designed a flour mill, utilizing the odds and ends of machinery which with difficulty could be gathered together, and for two years or more Robert College and those dependent on it ate bread made from flour ground on the premises. But for this feat, accomplished in the face of great difficulties, the college would have been obliged to close its doors. As it was, it continued uninterrupted throughout the war, befriended especially by Taalat Bey, who thwarted the hostility of Enver, the war minister.

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* Associate Professor of Structural Engineering, Massachusetts Institute of Technology.

Today the Engineering School, with its 125 or more students, exceeds somewhat in numbers the older college. The Academy, with about 500 boys, is by far the largest branch of the school. Among these 125 is a considerable group maintained there by the Turkish government, pledged to go into Anatolia on governmental work on the conclusion of their studies. Perhaps a half or more of the engineers are Turks by race; the rest are Russians, both Red and White, Armenians, Greeks, Albanians and representatives of many other Near East nations. We hear much about racial friction in the Balkans. Here in Robert College it is absent. Moslem Turk and Christian Armenian co-operate freely and easily in all the activities of the classroom and of extra-curricular life. In a troubled world, where racial differences make for enmity and conflict perhaps as much as any other single cause, the influence of this institution is a tremendous thing. When we recollect the extent to which Robert College graduates have played major parts in the affairs of their nations in the past it is plain that this is much more than mere rhetoric. Add to this the fact that many

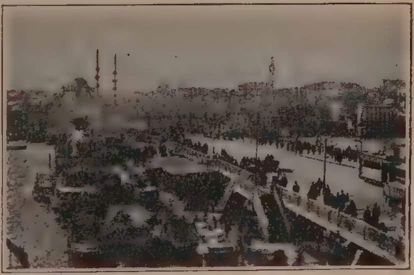

Fig. 2. — Galata Bridge

an official high in the ranks of the government at Angora has a son or nephew here among the students on the hill by the Bosporus, and we have another of the many facts proving the truth of the contention that a new day has dawned for Turkey, and that a new group of genuinely enlightened men is at the helm.

In the Engineering School of Robert College instruction is given in civil, mechanical and electrical engineering. At the start the curriculum was modeled upon the familiar plan of our technical schools here at home, — a four-year course leading to the familiar degree of Bachelor of Science, a designation upon the sheepskins which must have caused puzzlement to more than one European employer and engineer. The staff is recruited in the United States from engineering teachers willing to go out to the intriguing borderland between East and West for a three-year period, winters spent in crowded effort with many classes, and summers spent in wandering about Europe, and even occasionally out to India and the lands between. American texts and American methods have resulted in a graduate not unworthy of our own schools, but inferior to the picked product of the continental Technische Hohschule.

A year ago the Turkish government made the requirement that curriculum and methods be brought up to European standards, and consequently the catalogue of this little Balkan school makes interesting reading for American engineers. The course has been lengthened to five years, starting at about the same level as our own schools and providing a course of study largely denuded of those subjects our pundits are fond of styling humanistic. English is on the list and also economics, but there are many of us who doubt whether that discipline has even yet escaped from its old-time designation, — the dismal science. In any case, it is strictly utilitarian in most engineering schools today. Not only has the course been lengthened, but in addition two summer terms of eight weeks each have been added to all courses for shop work and surveying, and a third summer session for more surveying for the civils. The Robert College civil engineer must put in a third more time at school than our men in order to graduate, and beyond his training in English (largely in composition and report writing) plus his glimpse of economics, he will have given no thought to history, politics, civics or any phase of social life and organization. He will keep his nose to the technical grindstone. In credit hours the count is even more in his favor. Our American median is about 150 credit hours for a four-year course, a credit hour signifying the expenditure of three clock hours of labor, class and study, per week for a semester. The total requirements for the five years at Robert College are now about 229 credit hours.

Fig. 3. — Byzantine Cistern

In this matter of the humanities, however, he does not suffer by comparison with his American brother, for by and large the comment above may be made of us here, also. He will give perhaps 13 per cent of his time to his English and economics, and this percentage approaches that recommended by the Society for the Promotion of Engineering Education for cultural studies. Our better schools recognize that while training in English increases personal culture, it does not add to the student's understanding of the human environment in which he must play his part in life. Accordingly, many of them require the study of history from the industrial revolution down to modern times, and in addition work in a field of electives designed to throw light upon the human and social problem. It is to be hoped the School of Engineering at Robert College will some day adopt this viewpoint.

These engineering students at Rumeli Hissar (the name of the castle attaches to the town in which the college grounds lie) are hard workers. Our students consider themselves thoroughly occupied when they carry the usual program which presupposes 48 hours of work a week in class and at study. With 20 and sometimes 23 credit hours per term, the Robert College engineers are expected to toil at least 60 hours through the seven days. And they fulfil expectations; they are not prominent in those out-of-class activities which keep their mates in the college busy quite as completely as any American collegian.

There is a spur behind to keep the engineer to the pace. He cannot graduate simply by obtaining the lowest passing grade in every subject, which we may designate as D (60 to 69 per cent); he must attain enough higher grades so that his average is that of C (70 to 79 per cent) for all his work. If in any year he falls below C in more than 20 per cent of his work he must repeat the year except for those subjects in which he gained B rating. If he fails in any subject he may not remove the condition by an examination unless his failure was distinctly near the dividing line; he must repeat it. These requirements are being maintained by American instructors with our own familiar standards for grading. The outlook for the future is for a Robert College engineering graduate with a first degree (the usual European diploma engineer, under the new rules) well up to the standard we set in our better schools for the master's degree.

Contact with the Robert College students working under the recently abandoned curriculum impressed one with their superior grasp of fundamental science and mathematics as compared with American students. From now on that difference should be more noticeable; the new curriculum gives to mathematics and chemistry nearly twice the time usual here, and to physics a somewhat smaller excess. The civil engineer will devote a markedly greater number of hours to steam and electric power than do our men, as would be expected from his attempt to measure up to continental standards.

Turkey today is in a period of development comparable to conditions in our own country following the Civil War. It is only five years since she freed herself from an autocratic rule which had kept her in poverty and stagnation for centuries. The great resources and possibilities of Anatolia are still to be developed. The first need is for railroads and highways, and so the call is for engineers who can go into the rough conditions of the interior and succeed with this pioneer work. The rulers of Turkey today mark a distinct break with the past, and they are pursuing a policy of education and development plainly destined to increase the happiness and prosperity of the great mass of the population. They are hindered in their work by the shadows from the past, among others that which seeks to saddle the government of today with the sins, real and alleged, of the past. Our regrettable failure a year and more ago to ratify the Treaty of Lausanne has added to the difficulties that encompass the new régime.

The Balkans still constitute an area of possible world danger, and any assistance we can give from this country to stabilize conditions there is a contribution to the advance of civilization. Turkey has manifested a strong will to peace and order under the wise rule of Mustafa Kemal Pasha, the Gazih (or conqueror), who led the country in most wonderful fashion to freedom and opportunity. One interesting addition to our American stake in Turkish progress was when a group of undergraduates at the Massachusetts Institute of Technology voted last spring to provide a new instructor at Robert College, a man made necessary by the increase of students these last two years. Although the young man accepting this appointment makes some financial sacrifice, he is due for a most stimulating experience. He will not see great engineering construction at Constantinople as we estimate greatness. He will see the famous Galata bridge, where it used to be said that East meets West, and reflect upon the reasons that led the engineers to support that bridge upon pontoons instead of piers. He will visit huge Byzantine cisterns built on a scale comparable with some of our covered reservoirs. He may have opportunity to study the plans we vaguely hear rumored concerning a 3,000 foot suspension bridge across the Bosporus to carry the Oriental Express toward Angora and Bagdad. But he will surely have opportunity to come to close acquaintance with the many races of that cosmopolitan city, and learn that the differences of race we talk about are largely imaginary things that fade away with mutual knowledge and good will. It will be his task to have a share in the work of a school internationally famous for its work for tolerance and progress.

PROCEEDINGS OF THE SOCIETY

MINUTES OF MEETINGS

Boston Society of Civil Engineers

SEPTEMBER 26, 1928. — A regular meeting of the Boston Society of Civil Engineers was held today in Chipman Hall and called to order by the President, C. B. Breed, at 7.15 P.M. There were about 190 members and guests present.

The minutes of the previous meeting (May 19, 1928) were approved as printed in the June JOURNAL.

The Secretary reported that the following new members were elected by the Board of Government:

June 20, 1928. *Members:* Willard H. Johnson,* Donald L. Macdonald, Norman P. Randlett.* *Juniors:* Arthur F. Gersbach, George A. Macdonald.

Sept. 26, 1928. *Junior:* Russell W. Bird.

The President reported the death of the following members:

Hezekiah Bissell, died June 24, 1928, a member since March 21, 1883.

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* Transferred from grade of Junior.

Thomas S. Burr, died July 26, 1928, a member since November 17, 1897.

Herbert N. Cheney, died September 12, 1928, a member since April 17, 1912.

Charles H. Gannett, died August 20, 1928, a member since May 19, 1897.

Franklin M. Miner, died September 15, 1928, a member since April 20, 1881.

John R. Rablin, died September 17, 1928, a member since October 17, 1906.

The President stated that committees would be appointed to prepare memoirs.

The President then presented a recommendation from the Board of Government of the Society that By-Law No. 8 be amended by omitting the last two sentences, second paragraph, and substituting the following:

> New members elected during the period from the close of the annual meeting to June, inclusive, shall pay full year's dues; members elected during the period from July to December, inclusive, shall pay one-half year's dues; members elected during the period from January to the annual meeting, inclusive, shall be exempt from dues during the remainder of that fiscal year. The fiscal year shall commence at the close of the annual meeting.

After accepting a further amendment proposed by Prof. C. Frank Allen it was *Voted*, "that By-Law No. 8 be amended by omitting the last two sentences of the second paragraph and substituting the following:"

> New members elected during the period from the close of the annual meeting to June, inclusive, shall pay full year's dues; members elected during the period from July to December, inclusive, shall pay one-half year's dues for that fiscal year; members elected during the period from January to the annual meeting, inclusive, shall be exempt from dues during the remainder of that fiscal year. The fiscal year shall commence at the close of the annual meeting.

In accordance with the By-Laws it will be necessary to have this amendment also passed at the October meeting of the Society.

Upon recommendation of the Board of Government as presented by the President the Society voted:

> That the Board of Government be authorized to use the income from the Permanent Fund for the current year to such an extent as they deem necessary in payment of the current expenses of the Society.

This matter will also be presented at the October meeting for final action.

The Secretary presented a letter from Calvin W. Rice, Secretary, the American Society of Mechanical Engineers, inviting the members of the Boston Society of Civil Engineers to attend the Regional Meeting of the A. S. M. E. to be held at Hotel Statler, October 1 to 3, 1928.

The President stated that the Program Committee has selected the following subject for this meeting, believing it would be of considerable interest to the members: "Duties of the Engineer in Connection with 'Land Takings' for State, Municipal and Public Utility Developments."

After a brief outline of the program he called upon Mr. Henry F. Bryant, Civil Engineer, Brookline, to discuss this question with particular reference to State and municipal projects.

Harold K. Barrows, Massachusetts Institute of Technology, and consulting engineer of Boston, then presented a paper on "Takings and Preliminaries for Power and Reservoir Development."

Mr. A. J. Harty, Engineering Department, C. H. Tenney & Co., and member of Program Committee of the Society, and who has been largely responsible for the topic of this evening, presented a paper on "Duties of the Engineer in Connection with Securing Land for Transmission Lines."

Mr. H. E. Weir, Attorney, of Boston, spoke on the question, "Legal Aspects of Land Takings."

Following the presentation of formal papers there was a discussion in which the following participated: Prof. C. Frank Allen, E. W. Branch, Bayard F. Snow, F. N. Fowler, John D. Haughey, and others.

The meeting adjourned about 9.40 P.M.

J. B. BABCOCK, *Secretary*.

Sanitary Section

October 3, 1928. — The meeting of the Sanitary Section was held in the Library of the Affiliated Technical Societies on Wednesday, October 3, 1928.

Preceding the meeting, 16 members and guests attended the usual informal dinner which was held at Patten's Restaurant.

The meeting was called to order at 7.15 p.m. by the Chairman, and the reading of the minutes of the preceding meeting was omitted.

Dr. Elmer W. Campbell, Director of the Division of Sanitary Engineering, State Department of Health of Maine, was introduced and spoke on "Summer Camp Sanitation." The paper was discussed by A. D. Weston, Prof. Gordon M. Fair and various others.

The attendance was 30.

Stuart E. Coburn, *Clerk.*

Excursion of Sanitary Section

June 6, 1928. — Twenty-five members and guests met at the Public Landing, South Boston, at 1.30 p.m. on June 6, 1928, for an inspection of the garbage disposal plant, the sewage pumping station on Deer Island, the screen-house on Nut Island, and the sewage outlets off Deer Island and Nut Island.

A boat was furnished through the courtesy of Coleman Brothers, the operators of the garbage disposal plant.

After the party had been escorted through the plant by Mr. R. J. Lyons and his aides, they found a lobster dinner and all the fixings awaiting them that had been furnished by Coleman Brothers.

After the cigars had been consumed, the party set sail for the sewage outlets, and Mr. H. T. Stiff, of the Metropolitan Sewerage Commission, directed them through the sewage pumping stations, explaining the salient features.

Stuart E. Coburn, *Clerk.*

Designers Section

October 10, 1928. — A joint meeting of the Designers Section and the Highway Section was held October 10, 1928, in Gilbert Hall, Tremont Temple. Mr. Hersum, Chairman of the Highway Section, presided and called the meeting to order at 6.05 p.m.

The topic of the evening, "Reconstruction of Vermont Highways and Bridges after the 1927 Flood," was introduced by Mr. Stoddard B. Bates, Commissioner of Highways, State of Vermont, who gave a general outline of the problems created by the flood. He was followed by Herbert E. Sargent, Chief Engineer, A. J. Runnals, Road Engineer, and A. D. Bishop, Bridge Engineer, of the Vermont Highway Department, who discussed the technical practices of the Department. A large number of unusually interesting slides were shown depicting the destruction caused by the water and the rapid reconstruction work being done by the State of Vermont.

Prof. H. K. Barrows of Massachusetts Institute of Technology spoke briefly of the value of reservoirs in times of flood. The effects of the flood in Massachusetts were described by Mr. Wm. F. Williams, Commissioner, and R. W. Coburn, Construction Engineer, of the Massachusetts Department of Public Works.

A rising vote of thanks was given to the speakers, followed by adjournment at 8.30 p.m.

Seventy-two members and guests were present.

Norman P. Randlett, *Clerk.*

Northeastern Section

October 10, 1928. — The meeting was held in Room 18 of the Huntington Building, and was opened by the Chairman, Harold L. Burton. The Chairman introduced the speaker of the evening, Prof. C. B. Breed of the Massachusetts Institute of Technology, who spoke on "The Engineering Features of the New State of Maine Development in Lucerne-in-Maine."

"The development is a large land project that was bought to be developed into summer camps. It is situated about halfway between Ellsworth and Bangor, and contains 6,000 acres of land, approximately 10 square miles. There were five things of engineering importance to look into in this project, — (1) water to drink; (2) transportation by highways and rail; (3) light and power; (4) communication, and (5) sewerage." Professor Breed explained very clearly how each of these problems was met, and took up several very unusual engineering problems which occurred. Then he went on to explain the very efficient method of field and office work that he used in the compiling of plans and other data. After the talk was over the speaker spent better than an half hour answering questions about the job.

There were about 50 members and guests present at the meeting. Light refreshments were served.

A. Malcolm Mager, *Clerk pro tem.*

APPLICATIONS FOR MEMBERSHIP

[October 20, 1928]

The By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of fifteen (15) days from the date given.

For Admission

Johnson, Arthur Edward, Hyde Park, Mass. (Age 23, b. East Boston, Mass.) Graduated from Mechanic Arts High School in 1923, and from Northeastern Evening Polytechnic School in 1927. While attending evening school he worked as rodman for town of Brookline during the daytime, under Mr. Henry Varney, for one year; as rodman and note keeper for Metropolitan District Water Commission for nine months; was transitman in engineering department, city of Medford, for about nine months, and had charge of a party for six months; at present is in construction department of New York, New Haven & Hartford Railroad. Refers to *C. O. Baird, T. A. Giblin, L. C. Latimer, F. P. Nickerson, H. A. Varney.*

Kenney, John Patrick, Roslindale, Mass. (Age 33, b. Ireland.) Graduate of grammar school, Newport, and of the high school in Providence, R. I. Worked at building trades in spare time; 1919–20, was superintendent of construction at Coddington Point, R. I.; 1920, took a structural engineering course at Northeastern College; 1921–22, took a building course, Lowell Institute; 1921–23, superintendent of construction with Fitzgerald Construction Company, and others. During this time he supplemented studies by private tuition and State courses; in April, 1923, commenced building operations on his own account, and at the present time is a general contractor. Refers to *H. J. Bateman, J. E. Cahill, A. D. Chiesa, Hyman Felderman, Israel Swirsky.*

Reed, Leon Harold, Pittsfield, Mass. (Age 32, b. North Adams, Mass.) Graduate of Pittsfield High School in 1915, and was enrolled the same year in the General Electric Engineering School for a three-year course of shop and practical assistant in mechanical drafting; 1917–19, was in the United States Army; from June, 1919, to September, 1920, was employed as transitman by the city engineer of Pittsfield; from September, 1920, to June, 1922, attended Wentworth Institute, and was graduated in architectural construction; from June, 1922, to February, 1923, was employed as an architectural draftsman; in February, 1923, was again draftsman and chief of survey party for city engineer of Pittsfield; in March, 1926, was given a rating of civil engineer, grade C, and since that time has been assistant engineer. Refers to *R. W. Emerson, A. A. Fobes, R. W. Mawney, E. A. Varney, W. C. Voss.*

YOUNG, HARVARD G., Ellsworth, Me. (Age 26, b. East Surry, Me.) Graduate of University of Maine, 1923, with degree of B.S. in mechanical engineering. From January 1, 1924, to January 1, 1925, with Wilmington Fibre Specialty Company, Wilmington, Del., as sales correspondent; January 1, 1925, to September 1, 1925, at home; September, 1925, to May 15, 1926, teaching mathematics and science in Henry Woods School, Barre, Mass.; May 15, 1926, to date, resident engineer with Maine State Highway Commission. Refers to *H. S. Boardman, L. O. Norwood, M. S. Stackpole, F. V. Wright.*

For Transfer from Grade of Junior

BIRRELL, DONALD VAN COURT, Bedford, Mass. (Age 28, b. East Orange, N. J.) Graduate of Rutgers University in 1922. With Stone & Webster, Inc., to date. Refers to *H. A. Hageman, T. B. Parker, G. R. Strandberg, D. M. Wood.*

NOWELL, JOSEPH C., JR., Brookline, Mass. (Age 27, b. South Dartmouth, Mass.) Entered Massachusetts Institute of Technology, 1919; graduated, with degree of B.S., in June, 1923; from June, 1923, to date, employed by Stone & Webster, Inc., as follows: July, 1923, to October, 1924, designing, detailing and checking concrete for power stations, flat slab industrial buildings, etc.; October, 1924, to August, 1926, structural steel design and checker, stadium design, transmission work, etc.; from August, 1926, to November, same year, field inspections and reports on modeling of a large sugar refinery; November, 1926, to June, 1927, structural steel and architectural designer and checker; June, 1927, to November, same year, resident engineer on a concrete flat slab type industrial building; November, 1927, to date, structural steel designer. Refers to *S. K. Cohen, W. M. Gooden, J. A. Howe, C. M. Spofford, R. G. Stafford.*

SANDERSON, WALLACE WHITNEY, Brighton, Mass. (Age 26, b. Watertown, Mass.) Graduate of Massachusetts Institute of Technology, 1926, with degree of B.S. Since graduation to date employed by Metcalf & Eddy as assistant chemist Refers to *E. S. Chase, S. E. Coburn, H. P. Eddy, Jr., L. M. Hersum, F. A. Marston.*

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FOUNDED 1848

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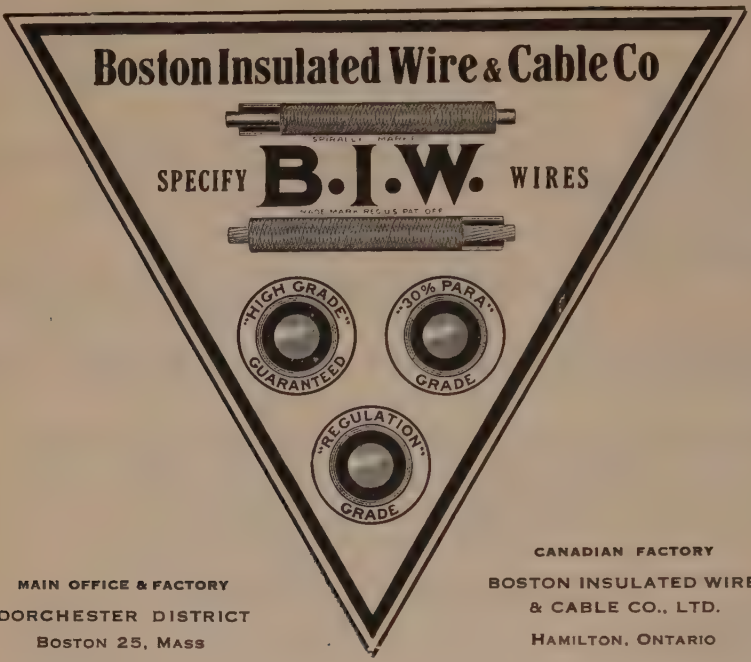

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